TPJ *2008 "Service Quailty Award"—Institute for Healthcare Improvement 20th Annual National Forum on Quality Improvement in Health Care*

Staff Solutions for Noise Reduction in the Workplace

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Abstract

Setting: A comprehensive noise-reduction project was initiated in response to low patient-satisfaction scores on an inpatient neuroscience unit at St Luke's Hospital and Health Network. The effects of noise on the health of patients and staff provided additional rationale for the project.

Methods: The performance-improvement model of Plan, Do, Check, Act, along with a literature review, was used to identify the negative effects of noise on patients and staff. Baseline decibel (dB) readings were obtained in ongoing data collection six times a day. Preproject and postproject patient surveys were completed. Comparisons of patient-satisfaction scores related to noise level were completed before and after staff education.

Results: Before project initiation, dB readings were found to be well above the hospital environment recommendations. Initial pre-education readings were as high as 78.1 dB; standard recommended levels are 40 dB. In April 2008, before project initiation, patient-satisfaction scores ranked in the second percentile in the Press Ganey large hospital grouping. Postproject scores rose to the 95th percentile by July 2008.

Introduction

The staff serving on the Professional Practice Council of the Inpatient Neuroscience Unit at St Luke's Hospital and Health Network, Bethlehem Campus, recognized a department trend for low patient-satisfaction scores related to environmental noise levels. The group also used a direct patient-satisfaction questionnaire related to noise because they believed that it showed the patients' true feelings and responses to the noise levels on the unit. The 40-bed unit has a variable census and semiprivate patient rooms and is part of the primary stroke center for the organization. The nursing station areas are shared by multiple care providers, including physicians, nurses, physical therapists, occupational therapists, case managers, and others, causing noise levels in work areas grow to even higher. Noise levels on the unit rose to an all-time high in April 2008 and patient-satisfaction scores plummeted in relation to noise level beginning in February 2008. On the basis of this information, the council embarked on a unit-wide noise-reduction project to improve the environment for patients and families.

The staff also believed that noise affected the physiologic, psychologic, and overall health of patients. This assumption was based on staff interaction with patients and feedback from other caregivers, validated by a literature review by staff members. Call[1] noted that "studies show that high levels of sound have negative physical and psychological effects on patients, disrupting sleep, increasing stress levels, and decreasing patients' confidence in their caregivers." Additionally, McCarthy et al[2] wrote that "environmental noise and its potential effects on healing and recovery rate are of special concern to nurses in hospital settings where increased levels of noise and the effects of noise on patient sleep and cognitive function have been well documented in the literature. There is a growing body of literature suggesting that interventions to reduce noise or to promote patient relaxation enhance physiological measures of recovery and patient perceptions of well being."

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Methods

In the initial phase of this project, the Professional Practice Council Members reviewed research articles and studies related to this topic as well as information regarding decibel (dB) levels and sound intensity for common noises.

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The methodology used for this project was PDCA—plan, do, check, act—the performance-improvement model adopted by St Luke's Hospital and Health Network:

> An assessment is made in the Plan phase of the project where measurement is utilized to determine improvement opportunities. The Do phase incorporates using tools and methods of quality improvement as part of the investigation (eg, practice guidelines, patient education, and provider education). At the Check phase, an assessment is made to determine the impact of the interventions. The Act phase is the incorporation of the tested intervention into widespread daily practice, ensuring that benefits gained from the improvement are maintained and that the process is periodically monitored to ensure a high level of performance.[3]

The goal of the project was to improve patient-satisfaction scores related to unit noise levels by 20% within six months. Evaluation methods were patient-satisfaction scores related to noise level, dB readings, and concurrent patient surveys. The team obtained baseline dB readings in five locations on the unit: at the main center nurses' station and at the first and last room on each side of the unit (odd- and even-side hallways). Those data were provided to all staff, along with education related to noise and patient healing.

A vital part of the project was to teach nursing and ancillary staff about the effects of noise and the importance of noise reduction for patient healing. Educational materials included information about the effects of common dB levels, such as that a dB level of 80 may lead to hearing loss[4] and that staff working in a noisy environment are vulnerable to exhaustion, burnout, depression, and irritability.[1] In addition, constant noise can produce an increased heart rate, decreased confidence in the competence of clinical caregivers, increased stress, confusion, cardiac problems, disrupted sleep patterns, decreased cognitive function, and altered hormone levels in patients.[5] Unit goals for acceptable noise levels were set at 40 dB during the day and 35 dB during the night, as recommended by the World Health Organization.[6]

Figure 1. Sound meter installed in nurses' station to raise awareness of sound levels.

The staff developed a data-collection process, a data-collection tool, and a schedule for obtaining dB readings. These were completed at 0700, 1000, 1500, 2000, 2300, and 0200 hours each day for three weeks before staff education, after staff education, and after six months. Decibel readings were obtained with a handheld dB reader at five locations: the nursing station and the two farthest ends of each patient hallway. In addition, sound meters were installed in nursing stations to increase awareness by staff of noise levels (Figure 1). These meters have a green light for acceptable noise levels, a yellow light to indicate increasing

Table 1. Responses to in-room patient-survey questions about factors that contribute to the noise level on unit

Patient	Before staff education	Immediately after staff education	Six months after education
1	Patients slamming their doors	People up and down halls, carts in halls	Other patients
2	Double rooms, roommates, visitors	Very quiet; don't pay any attention	Beeping machines, crowded rooms
3	Machines, other patients in room, traffic outside room	Doctors talking; wheels too hard—that's what makes the noise	[No response]
4	Beeping machines, technology driven	[No response]	Heart monitors, call bells
5	None	IV pumps	Alarms
6	Telemetry beeps all night and day	Double rooms, visitors	What noise?
7	I like all the noise around and outside my room	Machines, typical hospital noise	[No response]
8	Chatter in the halls	Beeping noises, machines	Nothing
9	None	Roommate	Small room, roommate
10	Staff yelling	Carts and hallway noise	Noise is normal; I can shut the door
11	Jobs that need to be done; staff conversation	On occasion—next room	I wouldn't say so
12	People talking; beeping noises	Talking; beeping machines	Talking in hallway; it's fine—it's been quiet
13	[No response]	Talking	No problem with noise
14	[No response]	Plumbing	It's quiet here
15	Call bells	Hall; girls working	Monitors; hallway traffic

noise levels, and a red light to indicate noise levels above the acceptable range.

Other interventions identified by team members as ways to decrease unit noise included obtaining and providing sleep masks and earplugs for patients, installing soft door closers, and removing rubber transitions between carpet and tile flooring at all doorways to decrease equipment noise. The team also reduced television and phone volumes, designated report areas away from patient rooms, coordinated patient-care activities to reduce patient disruptions, implemented random in-room patient surveys to assess perceptions of noise, and implemented unit quiet times.[7] The team continued to communicate dB readings, patient survey results, and satisfaction scores to all staff.

Results

Preproject patient-satisfaction scores, as measured by Press Ganey Associates, Inc for noise level in and around room in the large-hospital category, ranked patient satisfaction for the Inpatient Neuroscience Unit at St Luke's Hospital in the second percentile in June 2008. On completion of the noise-reduction initiative and staff education in July 2008, patient-satisfaction scores increased to the 95th percentile. Figure 2 shows monthly percentile rankings of patient satisfaction related to noise levels.

Variation in dB levels was noted, but there was improvement in all time frames and areas monitored after staff education was completed. Figure 3 shows the average daily pre-education, post-education, and six-month follow-up dB readings. Before staff education, dB readings ranged from 26.1 to 78.1 dB. The loudest area on the unit was the nurses' station, which has the highest activity level and is the central area for call bell and telemetry monitoring. Overall, the highest dB levels were recorded at 0700, 1000, and 1500 hours. The two highest noise levels were at shift changes. Before staff education, the average noise levels for these times reached 65 dB, whereas after education average readings peaked at 61.3 dB. Six months after education, readings averaged a high of 56.1 dB.

Concurrent in-room patient surveys were also completed for comparison of qualitative and quantitative data.[8] The surveys were conducted in patients' rooms. The patients were asked to rate their overall satisfaction with the noise level throughout the day as very good, good, fair, or poor (Figure 4). They were also asked to list noise contributors[7] (Tables 1 and 2).

In reviewing survey results, we found that before staff education, our patients rated noise levels from poor to very good, with the majority of the responses being good. Patients relayed that the noise they experienced came from staff, hallway noise, other patients, double rooms, roommates, equipment, technology, and general hospital noise. Although many patients stated they understood that hospitals are noisy, they offered suggestions for decreasing noise levels, such as closing doors, having private rooms, limiting visitors or visiting hours, and improving technology. On surveys after staff education, improvement was apparent in fewer poor ratings and an increase in good to very good ratings. Surveys were repeated six months after the project. Patients' perceptions of noise levels had improved, with no poor ratings and an increased number of fair, good, and very good ratings. At that point, patients noted that the noise levels they experienced were related less to staff than to external environmental noises such as technology and other patients (Figure 4).

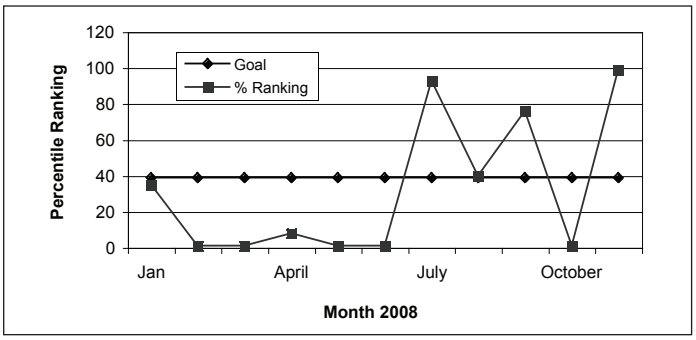

Figure 2. Press Ganey scores: noise level in and around your room.

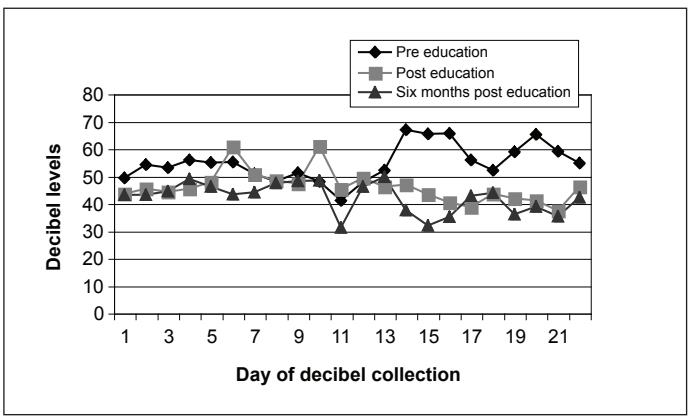

Figure 3. Decibel levels at nursing station.

Discussion

On our unit, noise reduction is a priority; it must be for us to make a difference. The noise-reduction strategies that we have implemented have resulted in a quieter

work environment, which is beneficial to both staff and patients. We have learned many lessons throughout this project. It is essential to involve committed, energized bedside staff if success is to be achieved. Begin by using evidence-based research as a foundation for your project; matching noise levels and patient outcomes is key. Educating all staff, including those in ancillary departments such as dietary and transport is necessary, as well as inclusion of patients and families in the project. Be certain to consider the environmental factors in your area, as they may have a major impact on noise levels. Always evaluate the process on an ongoing basis to allow for continual improvement opportunities. Use data to measure your success and to determine opportunities for future projects. Be certain to share your information and story with everyone: physicians, nursing staff, supervisors, senior leadership, patients, and family members.

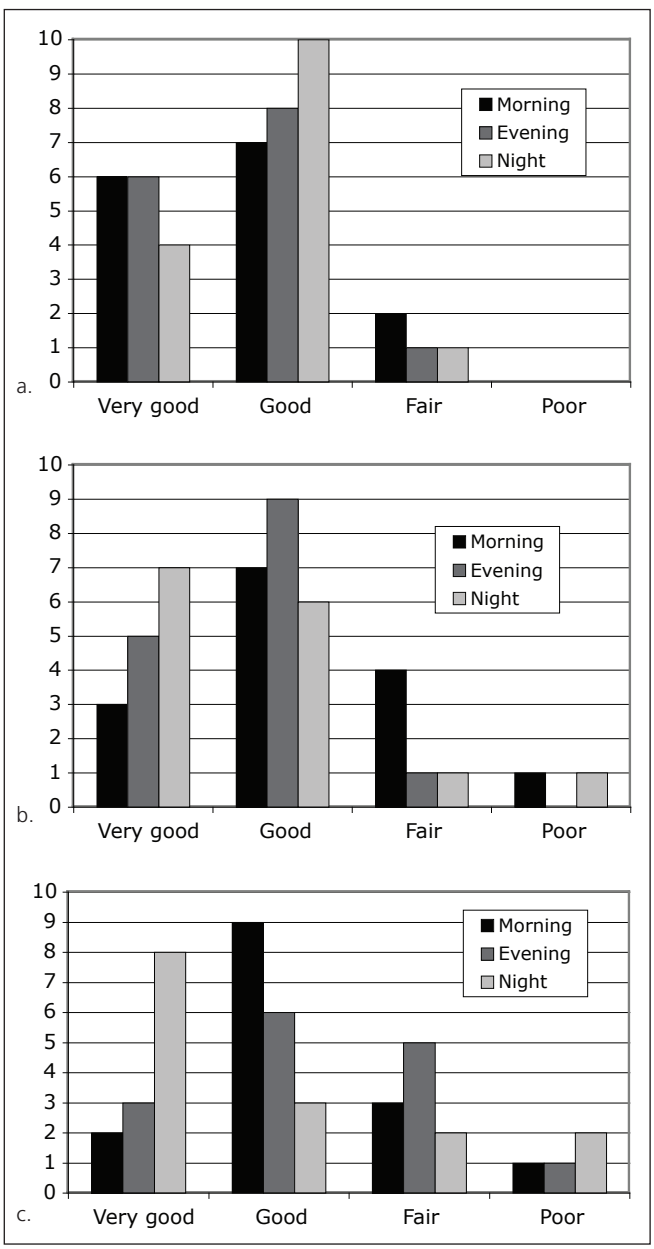

Figure 4. Patient survey responses to the question "Please rate the noise level in and around your room" in a) "pre-," b)"post-," and c)"six-months post-" education time frames.

Even small changes made to decrease noise levels can affect patient well-being and improve their satisfaction level. Ongoing educational updates are also important in successful management of noise levels on a nursing unit. Environmental causes should not be underestimated. Take the time to talk with patients and staff to find out where the noise is coming from and determine what steps you can take to minimize as many extraneous sources of noise as possible. To assist in controlling hospital noise that cannot be eliminated, consider providing sleep masks and earplugs to patients, depending on their condition and care needs. We provided these items on our unit; it was a successful intervention much appreciated by patients.

Possible biases in this project include measurement biases in dB readings and in patient surveys. Multiple individuals measured dB levels at different times, which might have led to variation in the actual times of measurement, the actual location of the measurement, and reading accuracy. Multiple people administered the patient survey and could have asked the questions differently. In addition, the surveys were conducted in patients' rooms, which might not have put patients at ease enough to allow them to give their true or complete feelings. Some ways to repeat this project and to control these biases might be to have dB readers installed in the areas where sound levels are to be measured and to provide for confidentiality by allowing patients to place completed surveys in a drop box before their discharge. ❖

Disclosure Statement

The author(s) have no conflicts of interest to disclose.

Acknowledgments

We thank the members of the unit-based practice council who worked diligently on this project to ensure its success. These individuals were the ones who helped to perform the initial review of the literature, create the educational plan for the staff, and then complete the decibel readings on the unit (Table 3).

Katharine O'Moore-Klopf, ELS, of KOK Edit provided editorial assistance.

Table 2. Responses to in-room survey question: What suggestions do you have to help decrease the noise level?

Patient	Before staff education	Immediately after staff education	Six months after education
1	Have noisy patients keep their doors closed	Keep voices down; very pleasant unit, efficient people	Can't be helped; answer noisy calls
2	Eliminate double rooms	No	I've noticed vast improvements in noise level; staff is very conscious of raising voices
3	No comment	Get the wheels to make less noise	[No response]
4	Decrease telemetry, but you get used to it, so forget it	[No response]	Can't control these things
5	None, thank you	Nothing	Keep the door closed
6	Find some technology to eliminate the noise or control it at night better	Private rooms	[No response]
7	If there was not any noises, the nurses wouldn't know the patients needed something	[No response]	[No response]
8	Limit number of visitors or [have] 11 PM curfew	No, it is understandable	No
9	Very happy here; everything good	Sleep aids	None
10	Need to keep door closed	Close door	I don't think so; I guess it's okay
11	More quiet at change of shift	Carts and hallway noise	I don't mind noise
12	Don't think it can be improved, I guess we need the beeping noises, (alarms, call bells)	[No response]	It's been quiet
13	[No response]	Carts and hallway noise	[No response]
14	[No response]	[No response]	No, everyone is nice and polite
15	Call light bell goes off after several rings, but light stays on	No suggestions	It's expected hospital noise

Table 3. Staff contributors

Name	Title or degree(s)	Practice council role; study role(s)
Katherine DiGirolamo	RN, BSN	Co chair; data collection and interpretation, literature review, education, interventions
Vanessa Brown	RN	Member; data collection, literature review, education, interventions
Shana Gibson	RN	Member; data collection, literature review, education, interventions
Daisy Cintron	Patient care assistant	Secretary; data collection, literature review, education, interventions
Scott Christ	Patient care assistant	Member; data collection, literature review, education, interventions
Cathleen Cooper	Patient care assistant	Member; data collection, literature review, education, interventions
Meredith Dull	Patient care assistant	Member; data collection, literature review, education, interventions
Giulia Genova	Patient care assistant	Member; data collection, literature review, education, interventions
Kristy Kennedy	Patient care assistant	Member; data collection, literature review, education, interventions
Britta Jacobson	RN, BSN	Member; data collection, education

Take the time to talk with patients and staff to find out where the noise is coming from …

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